CERTIFICATION

I, Lydia Johnstone-Sanchez, a translator of the English and German languages, do hereby certify the attached document to be a true copy of German Patent Application No. DE 103 165 71.1 filed 04/10/2003

Signed. Johnstone-Sanchez

Dated. 27/9/10

Control apparatus for an extractor apparatus

Description

The present invention relates to an extractor apparatus and to a method for controlling an extractor apparatus.

Prior art

Extractor apparatuses are preferably used in kitchens above a hotplate, in order to remove air laden with steam and vapor away from the hotplate. A distinction is made here between circulated air hoods, which extract the air from the hotplate, filter it and return it to the room and exhaust air hoods, which extract the air, filter it and convey it outside into the atmosphere.

If an exhaust air hood is now operated in a room with an open fireplace, there is the risk that flue gases developing from the fireplace are drawn into the room. To prevent this, the prior art proposes numerous solutions.

DE 100 28 333 A1 indicates a wireless safety circuit arrangement for an exhaust air extractor hood, in which the extractor hood is then switched off, if it is determined that an air supply flap or another air supply opening, like a window or a door, is closed. The transmission as to whether such an air supply flap, a window or a door is closed, takes place wirelessly.

DE 30 40 051 A1 indicates a control apparatus for an exhaust air-circulated air extractor hood, in which the exhaust air and/or the circulated air is to be controlled as a function of the pressure of the ambient air.

JP 081 70 846 A indicates an extractor hood, in which a pressure sensor is provided in the exhaust air channel. If the pressure of the exhaust air falls below a predetermined value, a controller deduces that a window or a door of the kitchen is not opened, whereupon an air supply ventilator is set into operation in order to feed air into the kitchen so that excessively low pressure in the kitchen is avoided.

JP 063 47 081 A indicates an air supply and exhaust air system for a kitchen having an extractor hood, in which the air supply is controlled by way of a air supply throttle valve, in order to prevent low pressure within the kitchen.

DE 92 08 718 U1 indicates an extractor hood for a kitchen having an exhaust air channel and a circulated air channel, which are connected to one another by way of a throttle. If the pressure in the kitchen drops too significantly, exhaust air flows via the throttle directly into the circulated air channel and thus back into the kitchen.

DE 910 10 95 U1 indicates an extractor apparatus having a volume flow measuring facility, which detects a pressure difference between the extractor connecting piece and the atmosphere around the extractor hood and from this determines the air volume flow through the extractor hood. The facility monitors the air flow through the extractor and warns the user of the extractor hood acoustically and optically if the air volume throw exceeds or fails to reach limits, which would result in an unsafe operating state of the extractor hood.

DE 39 25 975 C2 indicates a switching apparatus for the optional circulated air or exhaust air operation of an extractor hood, with a switching member automatically being actuated by way of a control facility detecting flue-bound heating devices in the operating state, such that if a heating device is operating, the extractor hood is switched to circulated air operation. The switching member may be a driven valve for instance.

DE 17 81 986 U1 indicates an air flap for ventilators, which are installed in rooms in which oil stoves are disposed, with a flap being provided to vent the room, which is opened when the ventilator starts to operate in order to vent the room.

These solutions described in the prior art are unsatisfactory because they are generally embodied in an excessively complicated fashion.

Object

The object of the present invention is to provide an extractor apparatus and a method for operating an extractor apparatus, in which a reliable operation of the extractor apparatus in a room with an open fireplace is fail-safe and can be realized in a simple fashion.

This object is achieved by the features of claims 1 or 2 or 12.

Because a control apparatus, which can be used in an extractor apparatus comprising a ventilator and arranged in a room, has a differential pressure detection facility for detecting the differential pressure between the interior in the room and the external pressure in the region outside of the room and a control facility for controlling the air delivery rate of the extractor apparatus as a function of the detected differential pressure, it is possible to reduce the air delivery rate if the low pressure in the room reaches a dangerous level when an open fireplace is operated in the room.

The differential pressure measurement between the internal pressure in the room and the external pressure in the region outside of the room, into which the extractor apparatus conveys the exhaust air, is advantageous in that irrespective of air pressure fluctuations in the event of weather changes or irrespective of the height of the installation site, an equalization is always performed between the internal pressure in the room and the external pressure outside of the room. In other words the control apparatus and/or the extractor apparatus, which is provided with a control apparatus of this type, functions safely and reliable at any installation site, without a calibration or post adjustment having to be performed.

Furthermore, this measuring facility is very simple and therefore cost-effective. In an advantageous embodiment of the invention, the differential pressure detection facility has an internal pressure sensor and an external pressure sensor and a comparison facility for comparing the detected internal pressure and the detected external pressure.

In an advantageous embodiment of the invention, the differential pressure detection facility has a first sensor line, which is connected to the installation room and a second sensor line, which is connected to the region outside of the room.

In an advantageous embodiment of the invention, the differential pressure detection facility in the room is preferably arranged on the extractor apparatus or in the region outside of the room or partially in the room and in the region outside of the room.

With the afore-cited arrangements, very simple detection can take place between the internal pressure and the external pressure in the region outside of the room.

In an advantageous embodiment, the differential pressure detection facility has a membrane, which is connected on the one hand to the room by way of a first sensor line and on the other hand to the region outside of the room by way of a second sensor line. The membrane is therefore exposed on the one hand to the pressure in the room and on the other hand to the pressure outside of the room. This arrangement is particularly simple and cost-effective, particularly if the first or the second sensor line is embodied as a hose line.

In an advantageous embodiment, a conduit for conveying the steam-laden air into the region outside of the room is provided and the second sensor line is laid along or in the conduit into the region outside of the room. It is herewith possible, for the second sensor line, to use an already existing opening and/or an already existing conduit in order to lay the sensor line.

In an advantageous embodiment, the control facility controls the ventilator such that, preferably in a control loop, the internal pressure does not drop below a predetermined differential pressure threshold value of preferably 4 pascals relative to the external pressure or that the ventilator is switched off, if the internal pressure drops below a predetermined differential pressure threshold value of preferably 4 pascals relative to the external pressure and that the ventilator is switched on if the internal pressure increases again to above the predetermined differential pressure threshold value relative to the external pressure.

In an advantageous embodiment of the invention, a warning signal output facility is provided, which outputs a warning signal if the internal pressure drops below a differential pressure threshold value of preferably 4 pascals.

The output warning signal may be an acoustic warning signal, preferably in the form of an interrupted warning tone or an optical signal, preferably in the form of a flashing red light or in the form of a display, which indicates to the user “Open window” or “Ventilate room”.

Further features and advantages of the invention result from the subsequent description of the exemplary embodiment with reference to the appended drawing.

Exemplary embodiment

The figure shows an exhaust air extractor apparatus in a room.

According to the Figure, the extractor apparatus 1 has a housing 2, a ventilator 3 and a control apparatus 4. The extractor apparatus 1 is arranged above a hotplate 6 in a room 5 with the internal pressure P_i. The extractor apparatus 1 conveys steam and vapor-laden air via a conduit 8 through an opening 8 into a region 9 outside of the room 5 with an external pressure P_a.

The control apparatus 4 has a differential pressure detection facility 10, a control facility 11 for controlling the ventilator 3 as a function of the differential pressure detected by the differential pressure detection facility 10 between the internal pressure P_i and the external pressure P_a. Furthermore, the control apparatus has a warning signal output facility 12, which can output a warning signal in the event of a predetermined differential pressure threshold value between the internal pressure P_i and the external pressure P_a.

The differential pressure detection facility 10 has a pressure sensor, preferably embodied as a membrane, which is connected to the room 5 on the one hand by way of a first sensor line 14 and is thus exposed to internal pressure P_i, and is connected to the region 9 outside of the room 5 on the other hand by way of a second sensor line 15, and is exposed to the external pressure P_a. The first and second sensor lines 14 and 15 are embodied as flexible hose lines.

The differential pressure detection facility 10 is able to detect the pressure difference between the room 5, which has the pressure P_i, and the pressure in the region 9 outside of the room 5, which has the pressure P_a, by way of the first sensor line 14 and the second sensor line 15. As an extractor apparatus extracts a lot of air from the room 5, a low pressure develops in this room 5, which results in the air extracted from the room 5 having to flow back into the room 5 by way of gaps at doors and windows. If an open fireplace with a chimney is located in the room 5, there is the risk that as a result of the low pressure developing in the room 5, smoke and flue gas from the open fireplace are drawn back into the room 5 by way of the chimney. Experience has shown that there is a serious danger, if the internal pressure P_i in the room 5 is lower by 4 pascals than the external pressure P_a in the region 9 outside of the room 5, into which the extractor apparatus conveys the exhaust air.

If the control apparatus 4 receives the message from the differential pressure detection facility 10 that the low pressure in the room 5 has exceeded the differential pressure threshold value of 4 pascals, the control apparatus switches off the ventilator and outputs a warning signal by way of the warning signal output facility 12, so that a user, for instance a cook, opens a room ventilation facility, like for instance a window or a door. If the differential pressure detection facility 10 determines that the low pressure in the room 5 has dropped back to below the differential pressure threshold value of 4 pascals, the control apparatus 4 switches the ventilator 3 on again. As an alternative to switching off the ventilator when the differential pressure threshold value of 4 pascals is exceeded, the control apparatus 4 can reduce the speed and thus the air delivery rate of the ventilator 3 until the differential pressure threshold value of 4 pascals is not exceeded. A certain extraction rate, a so-called emergency operation of the extractor apparatus, can be maintained in this way, with the necessary safety simultaneously being ensured.

A buzzer can be provided as a warning signal output facility 12, said buzzer emitting an warning tone, preferably an interrupted warning tone, or an optical signal, like for instance a flashing red light and/or a display, which lights up a message such as “Ventilate room” or “Open window” or suchlike.

The control apparatus 4, which includes the differential pressure detection facility 10 and the control facility 11, can be retrofitted as a unit in each already existing extractor hood, with only a second sensor line 15 in the form of a hose having to be laid through the conduit 7 into the region 9 outside of the room 5 and the ventilator 3 having to be correspondingly connected electrically to the control apparatus 4.

The differential pressure detection facility 10 for detecting the differential pressure P_d between the internal pressure P_1 in the room 5 and the external pressure in the region 9 outside of the room 5 can, instead of the previously described membrane, comprise an internal pressure sensor (not shown) and an external pressure sensor (not shown) and a comparison facility for comparing the detected internal pressure and the detected external pressure.

Claims

1. A control apparatus for use in an exhaust air extractor apparatus comprising a ventilator (3) and arranged in a room (5), having
a differential pressure detection facility (10) for detecting the differential pressure (P_d) between the internal pressure (P_1) in the room (5) and the external pressure (P_a) in the region (9) outside of the room (5) and
a control facility (11) for controlling the air delivery rate of the extractor apparatus as a function of the detected differential pressure (P_d).

2. An extractor apparatus having
a ventilator (3) for extracting the vapor-laden air from a room (5) and conveying the extracted air in a region (9) outside of the room (5), characterized by,
a differential pressure detection facility (10) for detecting the differential pressure (P_d) between the internal pressure (P_1) in the room (5) and the external pressure (P_a) in the region (9) outside of the room (5), and
a control facility (11) for controlling the air delivery rate of the ventilator (3) as a function of the detected differential pressure (P_d).

3. The apparatus as claimed in one of claims 1 or 2, characterized in that the differential pressure detection facility (10) has an internal pressure sensor and an external pressure sensor and a comparison facility for comparing the detected internal pressure and the detected external pressure.

4. The apparatus as claimed in one of claims 1 or 2, characterized in that the differential pressure detection facility (10) is connected to the room (5) by way of a first sensor line (14) and to the region (9) outside of the room (5) by way of a second sensor line (15).

5. The apparatus as claimed in one of claims 1 to 4, characterized in that the differential pressure detection facility (10) is arranged in the room (5) preferably on the extractor

apparatus or in the region (9) outside of the room (5) or partially in the room (5) and partially in the region (9) outside of the room (5).

6. The apparatus as claimed in one of claims 1 to 5, characterized in that the differential pressure detection facility (10) has a membrane, which is connected on the one hand to the room (5) by way of a first sensor line (14) and on the other hand to the regions (9) outside of the room (5) by way of a second sensor line (15).

7. The apparatus as claimed in one of claims 1 to 6, characterized in that the first and/or the second sensor line (14, 15) is a hose line.

8. The apparatus as claimed in claim 6 or 7, characterized in that a conduit (7) is provided for conducting the vapor-laden air in the regions (9) outside of the room (5) and that the second sensor line (15) is laid along or in the conduit (7) into the region (9) outside of the room (5).

9. The apparatus as claimed in one of claims 1 to 8, characterized in that the control facility (11) controls the ventilator (3) such that, preferably in a control loop, the internal pressure (P_i) does not drop below a predetermined differential pressure threshold value (P_a) of preferably 4 pascals relative to the external pressure (P_a), or that the ventilator is switched off if the internal pressure (P_i) falls below a predetermined differential threshold value (P_d) of preferably 4 pascals relative to the external pressure (P_a) and that the ventilator (3) is switched on if the internal pressure (P_i) exceeds the predetermined differential threshold value (P_d) relative to the external pressure (P_a).

10. The apparatus as claimed in one of claims 1 to 9, characterized in that a warning signal output facility (12) is provided, which outputs a warning signal if the internal pressure drops below a differential pressure threshold value (P_d) of preferably 4 pascals.

11. The apparatus as claimed in claim 10, characterized in that the output warning signal is an acoustic warning signal, preferably in the form of an interrupted warning tone and/or an

optical signal, preferably in the form of a flashing red light, and /or in the form of a display "Open window" or "Ventilate room".

12. A method for operating an extractor apparatus having a ventilator (3) for extracting the vapor-laden air from a room (5) and conveying the extracted air into a region (9) outside of the room (5), characterized by detecting the differential pressure (P_d) between the internal pressure (P_i) in the room (5) and the external pressure (P_a) in the region (9) outside of the room (5) and controlling the air delivery rate of the ventilator (3) as a function of the detected differential pressure (P_d).

13. The method as claimed in claim 12, characterized by controlling the air delivery rate of the ventilator (3) such that the internal pressure (P_i) does not drop below a predetermined differential pressure threshold value (P_d) of preferably 4 pascals relative to the external pressure (P_a).

14. The method as claimed in claim 13, characterized by
switching off the ventilator (3), if the internal pressure (P_i) drops below a predetermined differential pressure threshold value (P_d) of preferably 4 pascals relative to the external pressure (P_a), and
switching on the ventilator (3) if the internal pressure (P_i) is above the predetermined differential pressure threshold value (P_d) relative to the external pressure (P_a).

15. The method as claimed in one of claims 12 to 13, characterized by
outputting a warning signal, if the internal pressure (P_i) drops below a predetermined differential pressure threshold value (P_d) of preferably 4 pascals relative to the external pressure (P_a), and
switching off the warning signal, if the internal pressure (P_i) exceeds the predetermined differential pressure threshold value (P_d) relative to the external pressure (P_a).

A page of drawings follows.